

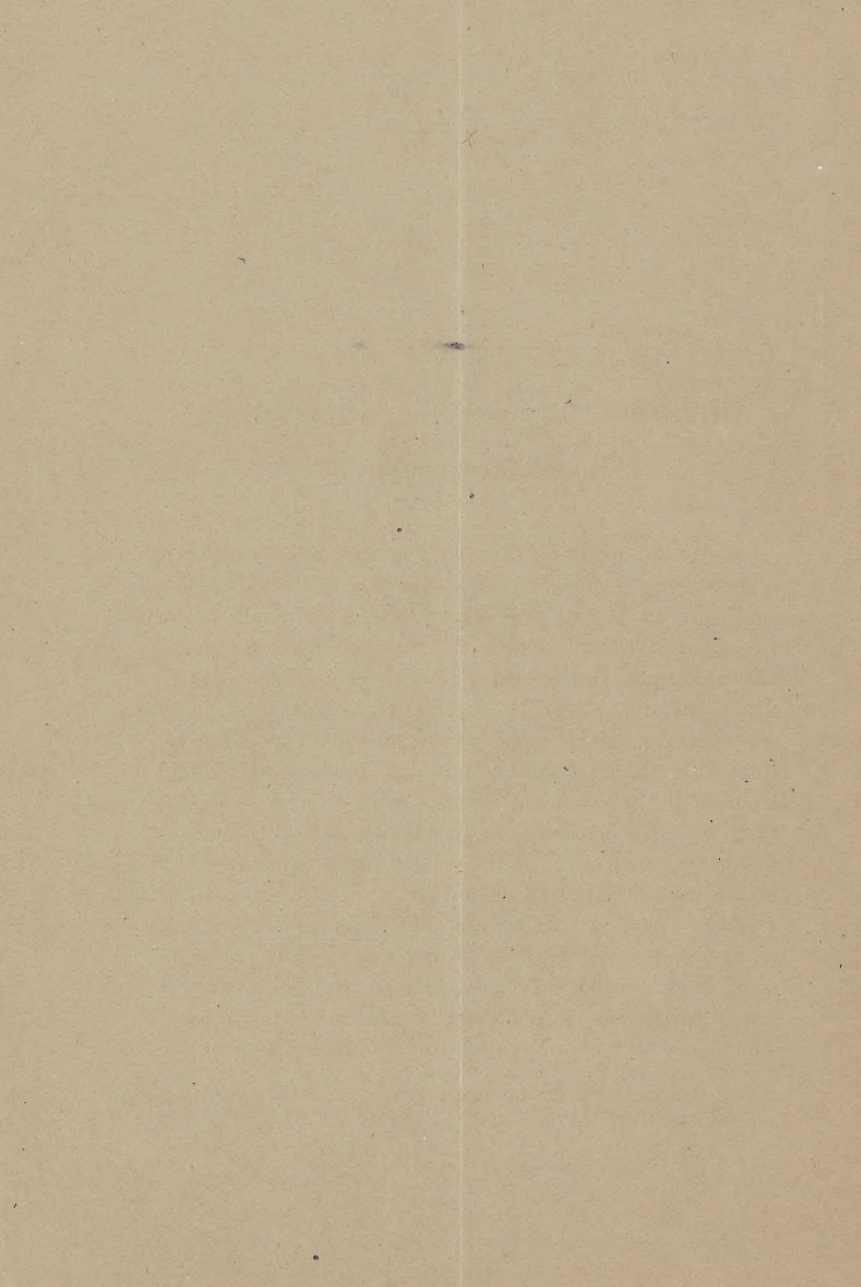
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Some Recent Advances in
Methods of Wound
Treatment.

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REPRINTED FROM
The New York Medical Journal
for September 6, 1884.



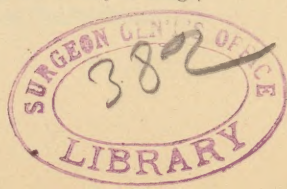


SOME RECENT ADVANCES IN
METHODS OF WOUND TREATMENT.*

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RATIONAL methods of treatment command permanent acceptance according to the perfection with which they carry out recognized principles. All the advances in the treatment of wounds which the present day is witnessing are based upon the one idea that the essential agents by which disturbances in the healing of wounds are excited are minute organisms, the germs of which are conveyed from without, either by the body that produces the wound, or from the air that gains access to it, or from something that comes in contact with it, whether it be the hands of the person that binds up the wound, or the appliances that he may use. The methods and appliances, therefore, which I wish to call attention to at this time depend for their merit either on their power of excluding such micro-organisms, or of limiting their activity, as in the case of the materials for dressings to be described, or on the facility with which they may be prevented from becoming the carriers

* Remarks made before the Medical Society of the County of Kings,
July 15, 1884.



of contamination, as in the case of the instruments and appliances. What I have to say will be arranged under the three heads of

1. Aseptic instruments.
2. Buried or layer sutures.
3. Absorbent dressings.

1. *Aseptic Instruments*.—From the standpoint of a possible sepsis, every joint, every roughness, every crevice, or angle, or absorbent surface about an instrument, is a source of danger. As example, take an ordinary torsion forceps, or needle forceps, and note the places for the lodgment of impurities underneath the catches, and slides, and springs, and in the crevices of the joint—places into which it is impossible to reach for even the purposes of ordinary cleanliness. The fashion of roughening the handles of scalpels and other instruments to give the fingers of the surgeon a more secure hold; even the stamping upon instruments the name of the maker—these produce objectionable depressions that make absolute cleanliness more difficult. The appreciation of the importance of these considerations is creating a new standard for instruments, which is characterized by the utmost simplicity of model, and plainness and smoothness of finish. The manufacture of instruments out of a single piece of metal, without joint or seam of any kind, is the highest type of this new standard. Where joints are unavoidable, the adoption, whenever possible, of the French joint, as it is called, which permits the parts to be easily unjointed and separated for purposes of cleansing, is another feature of this new standard. Already in the instrument-shops are beginning to appear instruments in the manufacture of which these considerations have been regarded. The instrument-makers of Germany have taken the lead in this direction, this being the natural outcome of the scientific precision which marks the work of the surgeons of that

nationality in their precautions against septic contamination of the wounds they make or have to deal with.

As an illustration of the possibility of applying these principles to comparatively complicated instruments, take the case of the "Russian" needle-holder, which, in its original model, notwithstanding its convenience in use, merits all the objections that have earlier been urged against instruments that can not be perfectly cleaned. Yet, in this modified instrument which I show you, and which has been constructed at my suggestion by Mr. Pfarre, of Tiemann & Co., all its objectionable features have been overcome, while it still remains practically the same instrument. One of its most objectionable features—the spring between the shanks of the handles, that was designed to automatically separate them—has been dropped as practically superfluous. The handles are of smooth vulcanized rubber, and, having been baked upon the metal in the course of manufacture, present neither crevice nor joint, and are so intimately incorporated with the metal portion of the instrument as to form practically a single piece. The catch is made so that it can be detached by a few turns of a thumb-screw, by which it is held in place, and, finally, the blades are joined by the "French joint," already alluded to, which permits them to be readily separated from each other. Thus the instrument can be easily and quickly taken apart, and the most perfect cleansing of every portion readily accomplished. One objection is to be made, however, to this particular instrument, and that is the fact that the manufacturer's name has been stamped on it. This creates an unnecessary source of trouble in the cleansing, which might properly be objected to by the scrupulous surgeon.

Let me call your attention to one more instrument illustrating this phase of the subject. Note the construction of so common and simple an instrument as the ordinary ana-

tomical or dressing forceps. The two pieces that constitute the blades are welded together, so that the approaching blades form a very acute angle, into the apex of which it is exceedingly difficult, nay, even impossible, to reach with anything to cleanse it, and in the usual attempts at cleansing the instrument there is always left a region where more or less objectionable material necessarily remains. In addition, the outer surfaces of the blades are generally roughened, in order to give the surgeon a firmer hold and better control of the instrument. But here I present a pair of anatomical forceps which, by one or two apparently trivial modifications, is freed from the objections noted. The acute angle has been filled up with a bit of metal, welded into its place, and the surface which it presents between the divergent blades can be readily reached and thoroughly cleaned. Then the roughening of the blades has been done away with, and a smooth and polished surface everywhere secured, except at the tips of the blades, where a certain amount of serration is required to give the forceps a sure grip upon the tissues it may seize.

As examples of the class of instruments which have been described, and which I have termed "aseptic," I present for examination a large variety, including different models of hæmostatic forceps, hook-retractors, sharp spoons or curettes, scalpels, dressing-forceps, amputating-knives and saws, chisels, gouges, drills, etc. These are all either made from one piece of metal, or have had their parts soldered together so as to leave no crevice, angle, or depression for the retention of septic matter. These are samples from quite a number of different German instrument-makers.

Of like excellence, from the standpoint of asepticity, is another series of instruments, which I also present for examination, in which, as in the case of the needle-holder already shown, the handles are made of smooth and pol-

ished hard rubber, the rubber having become intimately incorporated with the metallic part of the instrument by having been baked upon it in the process of vulcanization. These have been made by Tiemann & Co., at the suggestion of Professor J. A. Wyeth. The result of the attempt has been to produce a very handsome and serviceable as well as "aseptic" class of instruments, the handles of which have the additional merit of being light and not corrodable.

In connection with these instruments, the cases in which they may be kept are worthy of attention. The general considerations, which have been alluded to, that make it important to banish everything in connection with surgical instruments that may harbor dust or resist easy cleansing, will urge us to throw aside the elaborate velvet- and plush-lined cases in which instruments have been wont to be placed, and to replace them with cases of the simplest construction, with racks of metal or polished wood for the support of the instruments. Samples of such cases, which I herewith present, show that, as regards looks, they may be quite the equal of the old styles.

2. *Buried or Layer Sutures.*—By this term is meant the application of a separate series of sutures to the deeper layers of tissue that may have been involved in a wound. By the use of as many successive layers of such sutures as may be required, all the parts of a wound, however deep, may be brought into absolute and secure apposition, and thus rapid and immediate healing be favored, from the bottom to the surface, as readily as if it had been only a slight superficial wound. As the wound is closed by the successive apposition of one layer of tissue after another, each series of sutures becomes buried, and receives no further attention, being left to the due activity of the tissues for removal by absorption. This buried or layer suture requires for its safe use a reliable article of catgut—one that the sur-

geon may be sure never to hear from again by reason of any irritation produced by it after it has been covered up from sight. Such a catgut can be very readily and quickly prepared from any ordinarily fair specimen of gut by immersing it in a watery solution of corrosive sublimate (1-1,000) for forty-eight hours, and afterward keeping it in an alcoholic solution of the sublimate of like strength until it is required for use.

This method of using sutures is a natural development from their use as ligatures, in which case it has become the habit to cut the threads off short and abandon (that is, bury) them in the tissues when the external wound is closed. The earlier employment of the buried suture was in attempts at the radical cure of hernia, and in certain plastic operations, as the repair of extensive perineal lacerations. It has lately been extended to securing deep apposition of the flaps made in major amputations, and is susceptible of being applied to many deep fresh wounds. It is a most valuable device for preventing the occurrence of deep cavities in which wound secretions might accumulate. Still, for its safe and successful use, without the accessory aid of drainage-tubes, considerable experience and judgment are required; indeed, for the general practitioner, I should say that the free use of drainage-tubes ought not to be dispensed with, even though the buried sutures were employed.

3. *Absorbent Dressings*.—In the practical application of antiseptic methods there is no point which is of greater importance than to secure, as an external covering to the wound, some material that shall readily and perfectly soak up whatever discharges may appear upon the surface. The proper apposition of the wound-surfaces having been accomplished, and adequate provision for the escape of the secretions having been made, the next thing is to provide absorbent materials for the external dressings, which themselves

must be purified from any matter that might contaminate the wound. The use of carbolated gauze for this purpose is familiar to all as a part of the dressing introduced by Lister. But the eightfold dressing of Lister is quickly soaked through, so that it must be covered with a layer of Macintosh to compel the diffusion of the secretions horizontally over its area, as well as to prevent the escape of the carbolic acid. Saturated as it already is with a solution of resin, it is only the interstices between its fibers that hold the secretions by the power of capillary attraction. It is difficult to prepare, it is expensive, it needs frequent changing, and it so rapidly loses its carbolic acid that it must have been quite recently made to be reliable. For these reasons substitutes for it are greatly needed—indeed, are imperative—if the best results in the treatment of wounds are to be made attainable by general practitioners. With the lapse of time, as the result of much experimenting, it has become apparent that the one great essential in a wound-dressing is its absorbing power. The first important contribution in this direction was the accidental discovery of the value of peat-mold as a wound-dressing by Esmarch in his clinic at Kiel—a discovery which has been followed up with energy by this surgeon and his assistants to the full development of their system of permanent dressings, in which absorbent materials, not necessarily peat-mold, form an essential part. Of the materials which have been used with advantage as absorbent dressings, there are two which, by reason of the energy of their action as absorbents, their cheapness and general availability, and the simplicity of their use, I desire to especially dwell upon in this connection; these are turf-moss and sawdust.

Turf-Moss.—This is the ordinary turf- or marsh-moss, growing in all temperate climates in damp and low places, and especially familiar to us from its use by florists as a bed

in which to thrust the stems of flowers and plants, and by nurserymen as a packing about the roots of shrubs and saplings that are to be transported some distance. It answers these purposes by reason of its power of sucking up and retaining moisture. The *Sphagnaceæ*, or turf-mosses, of which there are a number of varieties, have their stems and leaves of a cellular and reticulated structure; a comparatively small proportion of the cells and spaces entering into their structure are filled with chlorophyll, the greater part of them being empty in the dry state, but rapidly sucking up and swelling out with fluid when brought in contact with moisture, the rapidity of this filling with fluid being facilitated by the existence of numerous perforations, communicating with the external air, that exist in the walls of the cells. This absorbing power eminently fits it for use as a wound-dressing. For this purpose, having been gathered and sorted over to free it from perceptible impurities, it is dried, and is then ready for use. It may be used either in the natural state or after having been first impregnated with some antiseptic, as corrosive sublimate or naphthalin. Unless this latter is done, the moss is likely to develop an unpleasant smell after it has been kept applied to a wound for a week or so. To Leisrink, of Hamburg, is due the credit of having introduced the use of this material, which he did in a communication to the "Berliner klinische Wochenschrift" in the fall of 1882. In the spring of 1883 it was made the subject of a communication to the German Surgical Congress by Hagedorn, of Magdeburg, and at the present time it is almost exclusively used as a wound-dressing in some of the largest clinics of Germany. It is used, made up into pads or cushions of various sizes, by inclosing the dried and prepared moss in bags of coarse gauze, smaller and softer pads, made out of the partly pulverized particles, being used to place directly upon the line of the wound,

while larger cushions are applied over these so as to cover an area some distance in every direction from the wound, and, in the case of the limbs, quite encircling them. It answers admirably for purposes of protection and compression by means of its softness and elasticity, as well as for the main object of absorption. I consider it a most valuable addition to the list of wound-dressings, and one which deserves to become popularized in the United States.

Sawdust.—In this cheap and despised material we have likewise a very superior substance for making absorbent wound-dressings. Compared with the other wood preparations that have been introduced—i. e., wood-wool and wood-flour—I think it is to be preferred, for it is practically as absorbent, and is much cheaper and more readily obtained. The fact that as an absorbent it answers all practical purposes, while it can always be obtained, and with little or no expense, leads me to think that it is destined to become the most universally used of all dressing materials in general practice. There was a hope that in absorbent cotton a most desirable and generally available agent for wound-dressings had been found, particularly as it was easily impregnated with various antiseptic substances, but, although unequaled as a protective and compressing agent, it has failed as an absorbent material. My observation is that only a limited layer of the cotton, immediately adjacent to the wound, absorbs, and that this quickly forms a crust which retains the discharges beneath it, or prevents their further escape from the wound. In this way I have been repeatedly disappointed in its use, and balked in my efforts at the drainage of wounds. For this reason I would reject it altogether as an immediate dressing, and reserve it only for external protective purposes. But even here it can be supplanted by quilted cushions of sawdust at a tithe of the cost. The dust obtained from soft and absorbent woods, as white pine

poplar, or basswood, is desirable if it can be obtained. It should be quite fine, and, if necessary, should be passed through a sieve to separate the coarser particles. It absorbs more readily and evenly if it is a little moist when applied, and for ordinary purposes it may be moistened to advantage with a dilute solution of corrosive sublimate, 1 to 1,000, at the time of using. The corrosive sublimate, of course, soon decomposes when thus mixed with the sawdust, and can not be depended on for maintaining a prolonged aseptic condition of the dressing. For this reason a sawdust dressing, if long retained, after becoming in some degree filled with wound-secretions, will become sour and smell unpleasantly. This may be obviated by mixing in with the sawdust, already dampened with the corrosive sublimate, a small amount of naphthalin, and a dressing so prepared may be retained for a prolonged period without becoming a source of danger or offense.

The sawdust is to be made up into pads or cushions with purified and absorbent gauze. This prepared gauze is simply the ordinary cheese-cloth of the shops, which has been boiled in a dilute solution of caustic soda or of potash for several hours, then repeatedly rinsed, and finally dried. This should finally be immersed for a few minutes in the corrosive-sublimate solution before it is used. With these means pads and cushions of any size may be made from two inches to half a yard square, having a general thickness of about one inch, the sawdust being prevented from shifting by occasional through-and-through stitching or quilting with thread.

Here is a little packet which I have received from Professor Esmarch. It is a sample of what is known as his "first dressing for the wounded on the battle-field." A word on the subject of the treatment of gunshot wounds before I show it. During late years the dangers of meddle-

some interference in the case of gunshot wounds have become well understood. It must be accepted as a settled canon of practice of the surgery of to-day that in the case of such wounds immediate disinfection of the apertures of entrance and of exit, if such exist, shall be accomplished, if possible, and that there be no further interference until those symptoms arise that indicate a necessity for it, or until the surroundings admit of the most exact antiseptic precautions being taken throughout, whatever interference is attempted. All probing, therefore, of a bullet track at the beginning of its history is to be esteemed an infraction of good surgery. To provide for the proper immediate dressing of a gunshot wound, Esmarch would have every soldier provided with one of these little packets and instructed in its use. His packet, as originally devised, consisted of a triangular bandage or handkerchief, a long, narrow bandage, folded, with safety-pins for fastening them, and two tampons made of salicylic jute, inclosed in salicylic gauze, the whole protected in an envelope of parchment-paper. But of late, as seen in this sample, the jute of the tampons has been replaced by sawdust which has been treated with corrosive sublimate. I show it here as an example of the use to which sawdust is being put in the matter of wound-dressings.

In conclusion, by way of practical illustration of what may be accomplished by consistent antiseptis, I desire to present for your examination this young man, who, on the 4th of July last, accidentally thrust his arm through a glass door and received thereby a deeply penetrating wound at the junction of the upper and middle forearm. The wound was transverse to the axis of the forearm, and completely severed the belly of the flexor carpi radialis muscle, wounding also the pronator radii teres, and opening up the deep intermuscular spaces, but without injury to any large blood-vessel. He was seen immediately by a neighboring physi-

cian, who, as there was then no hæmorrhage, dressed the wound by several points of suture through the skin, and by a firm bandage to the forearm. In the course of the night a general hæmorrhagic oozing from the wound-surfaces began; the stitches that closed the wound externally held firmly, and the blood, denied exit, infiltrated the intermuscular spaces, causing the whole forearm to become greatly swollen, the infiltration extending on the inner side of the arm half way up to the shoulder. The next morning I saw him, and reopened the wound by cutting the sutures that had been applied, and, in addition, enlarged the wound by a long incision down the axis of the forearm from the middle of the original wound. The clots with which the parts were infiltrated were turned out and cleared away as perfectly as possible by scraping with a sharp spoon. A thorough irrigation with a solution of corrosive sublimate, 1-1,250, was then made, the wound was packed with iodoform gauze, and a compress and bandage were applied over all. This dressing was hardly completed before it became evident that there was a peculiar hæmorrhagic condition present in this wound, for through the dressings that had been applied quite a free oozing of thin bloody fluid quickly appeared, and was so marked that I thought best to remove the dressings, and reapply them after a few moments' exposure of the interior of the wound to the air. I then packed it with a purified sponge, thrusting this thoroughly down into the crevices of the deeper parts of the wound, and over this I again applied a tampon of iodoform gauze supported by a bandage. Still the oozing of bloody fluid, percolating through these dressings, continued to such an extent that I did not think it safe to leave it, and, after waiting a few moments, I again removed all the dressings that had been applied and exposed the wound. The bleeding was a general oozing; there was no tendency to coagulation manifested by the blood. At a num-

ber of points I now applied catgut ligatures, inclosing small masses of the tissues where the oozing was most profuse, applying also compresses wrung out in quite hot water. Still the oozing was only partially stanchèd; I then packed the wound with two sponges, coupled with the iodoform tampon and the compress and bandages as before. By these means the hæmorrhage was finally controlled in great measure, although during the following night there was considerable oozing of bloody serum through these dressings, but no positive hæmorrhage. For two days the dressings were left undisturbed. At the close of the third day I determined to remove the tampons and bring the parts into apposition as far as might be possible. Upon removing the external dressings, I found that already an active process of granulation had been set up, and that the new granulation material had so extended itself into the interstices of the sponges that the sponges could not be removed without tearing the adhesions thus formed. This produced a slight bleeding, which at once ceased spontaneously. The wound was then irrigated with the corrosive-sublimate solution, the wound surfaces were brought together by sutures deeply inserted, and a drainage-tube was inserted to the bottom of the deepest part of the wound cavity. Over all was placed a cushion of sawdust moistened with the corrosive-sublimate solution. On the two following days the saturation of this pad with serous discharges was so marked that each day a new pad was substituted, irrigation of the wound and of the adjacent surfaces being carefully attended to each time. On the third day the drainage-tube was removed and a new pad applied, and on the following day also a fresh pad was applied. This last dressing was made four days ago, and it has not been disturbed since.

It is now the twelfth day since the infliction of the injury, and up to the present time there has been no suppura-

tion from the wound, the discharges having been purely serous. None of the ordinary signs of inflammation have been visible about the wound; but, from the time that it was enlarged, cleared of its clots, and the hæmorrhage checked, its condition has been one of progressive well-being, and this notwithstanding a combination of conditions that afforded good grounds for the gravest apprehensions as to possible diffuse phlegmonous inflammation and prolonged suppuration and tedious recovery.

If you will indulge me, I will now remove the dressings and submit the wound to your inspection. The parts being now exposed, there is seen a T-shaped wound of the forearm nearly healed, and its borders presenting a soft and healthy appearance. Upon the lower surface of the pad that was removed a few drops of pus are discernible. There are no secretions upon the surface of the wound. The ecchymotic condition of the subcutaneous tissues of the forearm and of the lower inner half of the arm is still very marked. [After the patient had been inspected by the members of the society, the wound was irrigated with a solution of corrosive sublimate, and again covered with a sawdust pad. The after-progress of the case to complete recovery was rapid and without accident.]

